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ABSTRACT

To assess the condition of American education in the next decade, the National Center for Education Statistics (NCES) should focus on collecting data in the following major areas: (1) the quality and quantity of time that is allocated to various activities in the classroom; (2) the concerns of teachers, including their working conditions and time spent on various activities; and (3) micro-computer usage in the schools and student engaged time in activities broken down by content of activity and by sex, race, and socioeconomic status of the user. The relevance, technical quality and utility of the data could be improved by collaborating with other large organizations, such as several of the Educational Research and Development Centers that will soon be funded by the National Institute of Education (NIE). NCES might collaborate with the following Centers: (1) NIE Center on Teacher Quality and Effectiveness to gather data from the teachers' perspective on working conditions and factors that affect teachers' decisions; (2) NIE Center on Student Testing, Evaluation, and Standards to develop and refine tests that measure higher level cognitive skills; and (3) NIE Centers on Effective Elementary Schools and Effective Secondary Schools to collect time and observational data on what students are actually doing and learning in classrooms. (JAZ)

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Assessing the Condition of Education in the Next Decade

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The stated purpose of the National Center for Education Statistics (NCES) is to collect data on the condition of education in the United States and to publish reports analyzing and interpreting these data (National Center for Education Statistics, 1984). One way to conceive of the role of the NCES is that the Center should collect data and provide interpretations of the data that are sufficient to give a "reading" of the general health of the nation's educational system. Just as a physician uses a few vital signs to assess the general health of the human organism, NCES should focus their efforts on a few selected areas of education rather than attempt to collect extensive data on a large number of variables. Thus, rather than collecting additional data on many new variables, I propose that NCES collect new and additional information in three major areas related to elementary and secondary education. Assessing these three major areas might be compared to taking the pulse, measuring the blood pressure, and examining the reflexes of the American educational system. In the sections that follow, I provide a brief discussion and rationale for the data collection in each of these new areas of education.

Three Needed Areas of New Data Collection

To assess the condition of American education in the next decade, we need information that addresses three major questions: (1) What are students doing and learning in the nation's schools? (2) What are the concerns and stresses facing teachers in the nation's schools? and (3)

TM 860 474

How are the nation's schools responding to the introduction of the microcomputer--a technological innovation that may or may not revolutionize American education?

"Taking the Pulse" of American Education: What Are Students Doing and Learning in the Nation's Classrooms?

While data such as expenditures for public schooling provide important information on the nation's priorities and are useful to policy makers and others who must allocate resources, they do not provide an adequate measure of either the quality or success of our educational system. The criterion typically used to judge the effectiveness of our schools is students' achievement scores. Therefore, the achievement data collected by the National Assessment of Educational Progress (NAEP) are extremely important.

NCES and NAEP should continue to collect student performance data, and they should give increased attention to the need to improve the measurement of higher-order cognitive skills in reading, mathematics, and science. Although NAEP's measurement of higher-order skills far exceeds that of traditional standardized achievement tests such as the Iowa Test of Basic Skills, their measurement of higher-order skill is far from perfect. Both NCES and NAEP should give high priority to refinement and further development of test items that measure students' higher-level cognitive thinking in the major subject areas.

While students' achievement scores are an important measure of the condition of education, students' learning actually occurs in the nation's classrooms. To take the pulse of American education, we need to know what students are doing and learning in classrooms in the United States. The best metric to use in such an analysis is time.

Following the publication of the Nation at Risk report in 1983, many states responded to the recommendations by lengthening the school day; many school districts set minimal standards for the number of minutes that teachers must spend teaching each of the major subject areas during a given week. The impact of these new guidelines on what teachers and students are doing in classrooms has not been assessed. Moreover, the best data on time and content coverage were collected by the Beginning Teacher Evaluation Study in the mid-1970's (Fisher, Filby, Marliave, Cahen, Dishaw, Moore, & Berliner, 1978; Denham & Lieberman, 1980), and these data have not been updated since (Fisher & Berliner, 1985). Moreover, the original BTES data were collected on only selected grades (second and fifth grade) in a small number of schools in California.

Information is needed not only on the quantity of time allocated and spent in various activities in classrooms and schools, but also on the quality of the activity. For example, in preparing the recent report on the state of the art and practice in teaching reading in our schools, the Commission on Reading was unable to find information on the time that teachers are spending in phonics instruction in the early grades (Anderson, Hiebert, Scott, & Wilkinson, 1985). Information was also not available on the amount of time that students are spending in silent and oral reading in the elementary and middle school grades. According to the Commission Report, these measures might serve as indices of the effectiveness of the reading instruction that is occurring in our schools and would be highly related to student achievement in reading.

Similarly, although some researchers have documented that elementary students spend more than 50% of their time during reading and mathematics in seatwork activities (Fisher et al., 1978; Peterson & Fennema, 1985), little descriptive information exists on what students are working on during seatwork. In particular, we need to know the amount of time that students are spending in "busywork" which is unrelated to the academic subject matter, compared to the proportion of time that students are spending on specific academic content whether it be content that consists largely of drill and practice and requires lower-level cognitive thinking or whether it requires the students to engage in higher-level thinking. In their recent review of the research on school effectiveness, Good and Brophy (in press) pointed out that similar data are needed for homework that is assigned to students. A popular widespread belief today among the general public as well as educators is that students are not getting enough homework and need to spend more time on homework. However, no data exist on how much homework is assigned to elementary and secondary students each day, how much time students spend on homework, and the content of the homework that is assigned.

The above are examples of data that are needed on time spent by students in various instructional activities. In addition, data are needed on time allocated and student engaged time. (See, for example, Denham & Lieberman, 1980; Fisher & Berliner, 1985). The results of the BTES Study showed that while allocated time in reading and mathematics was significantly positively related to student achievement in reading and mathematics, student engaged time in reading and mathematics was a better predictor of achievement than allocated time.

How should allocated time, time spent, and student engaged time be assessed? Unfortunately, these data cannot be gathered by means of a survey or questionnaire administered once which appears to be the typical data collection technique used by NCES. Allocated time has been measured by having teachers log the amount of time that they schedule per week for a given content area. It is important that the content area be defined more specifically than simply reading, mathematics, or science so that the information will be useful to educational scholars and practitioners. Marliave, Fisher, & Filby (1977) reported that allocated time data from teacher logs "agreed at an acceptable level with the criterion of observational data" (p. 57). They noted further that the data were more reliable if they were recorded immediately after the event. Thus, perhaps teachers should not be asked to record the allocated time data for a whole month at a time, but rather for a week or several days at a time. In addition, although no researchers have investigated how many times during the year one must collect teacher logs on allocated time to get a generalizable estimate, one presumes that this information would need to be collected several times throughout the year.

Data on time spent and student engaged time must be collected through actual classroom observations. Although such observational data are costly to collect, they might provide a more valid measure of the condition of education than much of the survey data that has been collected by NCES in the past. Moreover, such information provides normative data on the quantity and quality of instructional practices that are occurring in various subject areas in our elementary and secondary schools as well as information on the quality and quantity of

the content that students are purported to be learning. Such information would be useful for educational practitioners, policy makers, and researchers. In addition, researchers on effective teaching have found allocated time, time spent, and student engaged time to be significantly related to student achievement. Thus, these data may serve as potential indices of the quality of instruction that is occurring in American classrooms.

"Measuring the Blood Pressure" of the Nation's Teachers: What are the Stresses and Concerns of Teachers?

An upcoming crisis that may significantly affect the condition of education in the next decade is the severe shortage of qualified teachers. Data collected by NCES show that by 1988 the demand for teachers will far exceed the supply (National Center for Educational Statistics, 1984). The National Science Teachers Association estimates that 300,000 new mathematics and science teachers will be needed by 1995--more than the total number of mathematics and science teachers currently teaching (Darling-Hammond, 1984). Furthermore, reports have documented that the most talented teachers are leaving the profession. (See, for example, Schlechty & Vance, 1983; Darling-Hammond, 1984). These two factors may result in a teaching force that is considerably less qualified and competent than the present teaching force, which may have significant negative effects on the condition of education in the next decade. For example, studies of schools have shown that staff stability is an important measure of an effective school (New York State Department of Education, 1974; U.S. Department of Health, Education, and Welfare, 1978).

At the minimum, NCES should continue to collect the kind of data on supply and demand of teachers and turnover in the teaching work force that it has collected in the past. In addition, NCES should continue to collect data on teachers' salaries because salaries in the teaching profession have been identified as one of the salient factors related to retention of qualified teachers (Darling-Hammond, 1984; Schlechty & Vance, 1983).

Beyond these data, information is needed on what factors may be related to teachers staying in or leaving the teaching profession. Thus, NCES should collect data on: (1) the stresses and concerns of teachers in our nation's elementary and secondary schools; and (2) information on the professional working conditions of teachers in elementary and secondary schools.

Few large-scale survey studies have been done to document the concerns of teachers. However, most recent reports on schools (e.g., Boyer, 1983; Sizer, 1984) as well as the surveys that have been done (Darling-Hammond, 1984) suggest that teacher dissatisfaction and stress may be most related to professional working conditions. In addition to collecting large-scale survey data on teachers' concerns and stresses that may be related to teacher retention, NCES should also collect data on working conditions in the school.

In the Milwaukee School District, the largest urban school district in the state of Wisconsin, the two issues that are of greatest concern currently to teachers are: (a) class size; and (b) the amount of preparation time given to teachers. As a consequence, the Milwaukee Teachers Education Association is introducing legislation in the Wisconsin State Legislature to decrease class size of Milwaukee teachers

and to increase their allotted preparation time. Inadequate preparation time was also one of three factors mentioned by the teachers in the Darling-Hammond (1984) study as causing the greatest teacher dissatisfaction.

NCES should continue to collect the kind of data that it has been collecting on teacher/pupil ratio and class size (NCES, 1985). NCES should also collect data on the amount of preparation and planning time given to teachers. This information might be collected through large-scale surveys of school districts and school principals. However, it is important to survey teachers about their preparation and planning time to check for validity and also for differences in perceptions of what constitutes planning and preparation time. In addition, data from teachers on how they spend their time during the day would provide some useful insights into the working conditions of teachers. For example, many studies have suggested that teachers are dissatisfied because they are overwhelmed with administrative duties and paperwork that detracts from the time they are able to spend in actual classroom teaching. (e.g., Boyer, 1983; Darling-Hammond, 1984).

"Assessing the Reflexes" of the American Educational System: How Are Schools Responding to the Microcomputer?

The recent influx of microcomputers into schools has stimulated widespread discussion and debate at all levels of our society. Indeed, the microcomputer has provided a focal point for contending educational philosophies and their attendant sets of priorities for allocation of funds and time within schools (Lepper, 1985). Enthusiasts believe that microcomputers will radically change education (Papert, 1980; Kleiman, 1984). Skeptics believe that the effects of the microcomputer are at

best exaggerated and at worst will have negative consequences for education (Weizenbaum, 1976; Sloan, 1984; Brophy & Hannon, 1984).

There are several major reasons for gathering information on microcomputer usage and how schools are responding to the advent of the microcomputer. First, just as one aspect of an effective organization is its ability to respond to change (Chandler, 1962; Miller, 1978), one index of the condition and quality of our educational system may be the way in which schools are responding to the advent of an innovation such as the microcomputer. Second, the new age of advancing technology and global competition has radically changed our concept of "basic skills"--the skills necessary for a person's economic competence. Students will need to have basic skills in the use of microcomputers in order to function successfully as citizens in our society. In addition, the microcomputer is potentially a powerful tool for ensuring mastery of other basic skills, especially in the areas of reading, writing, and mathematics.

Third, information on how schools are using microcomputers provides an index of how our educational system is currently responding to issues of social equity. Although children from higher income families frequently have microcomputers at home, children from lower income homes rarely do. Further, schools serving more affluent communities frequently have greater parental pressure to acquire microcomputers, greater resources to buy them, and greater human resources for using them widely. If children from low income families are not given access to the new technologies in schools, they may fall even farther behind their affluent peers in their preparation for employment in a era of high technology. The same issues arise with respect to gender.

Considerable evidence exists that boys are much more likely than girls to become involved with microcomputers (Kisler, Sproull, & Eccles, 1983), especially at the more advanced levels (Hess & Miura, in press). Microcomputers are still a relatively scarce resource, especially in elementary schools. The educational community, policy makers, and the general public need to know how schools are responding to the challenge and opportunity to make effective and equitable use of this scarce resource.

Thus far, the only extensive national data collected on microcomputer usage in the schools is from a national survey conducted by (Becker, 1983a, 1983b, 1983c, 1984). These data were included in the 1984 Statistical Report of NCES. While survey data are useful on the number of computers owned by a school and the average amount of time per week that students spend on the computer, observational data are needed both to check the reliability of the survey data and also to provide a more complete picture of how microcomputers are actually being used in the schools. To address the issue of social equity, all data on microcomputer usage should be broken down by sex, race, and socioeconomic status (SES) of student.

The data collected on microcomputer usage in the schools should be similar to the kind of data described above on what students are doing and learning in the classroom. Such data might include: (1) allocated time on the microcomputer broken down by grade, sex, race, and SES of student; (b) actual time spent per week per student broken down by the same categories of student; and (c) student engaged time on the microcomputer per week. Allocated time data should be collected through teacher logs and logs of teachers who have responsibility for the

microcomputer resource room. Allocated time and actual time spent should be clearly differentiated. For example, it is not clear whether in responding to Becker's national survey, schools were reporting weekly use data on microcomputers that reflected allocated time or actual time spent on the microcomputer. This question might be addressed by collecting observational data which could be used to check the reliability and validity of the survey data on time usage.

Data on time spent by each student on the microcomputer and student engaged time on the microcomputer should be collected through classroom observations and through observations in the microcomputer resource room. Observers should record the kind and content of the activity in which students are engaged while working on the microcomputer. Information is needed on: (a) how much time students are spending on actual academic activities compared to game-like activities; (b) whether the activity teaches computer literacy or a subject matter such as reading, mathematics, or writing; and (c) whether the microcomputer activity is a higher-level cognitive activity such as problem solving or a lower-level cognitive activity such as drill and practice.

Summary

In sum, we have argued that, in the next decade, NCES should collect data in three major new areas: (1) the quantity and quality of time that is allocated to various activities in the classroom, and the amount of time students are actually spending and engaged in such activities; (2) the concerns of teachers in our nation's schools and information on working conditions, including the amount of time that teachers are spending in various activities during the day; and (3) microcomputer usage in the schools, including allocated time, time

spent, and student engaged time in activities broken down by content of activity and the sex, race, and socioeconomic status of the user.

Finally, in the next decade, NCES might improve the relevance, technical quality, and utility of their data as well as improve the cost effectiveness of their data collection efforts by collaborating with other large organizations, both in planning data collection and in gathering the data. One productive avenue for collaboration would be for NCES to work closely with several of the Educational Research and Development Centers that will soon be funded by the National Institute of Education (NIE). NIE has requested that each of these Centers reserve 10% of their budgets in 1987 through 1990 for collaboration with other national Centers (National Institute of Education, 1984).

If NCES were to focus its new data collection efforts on the issues emphasized in this paper, then NCES should explore collaborative relationships with the following Centers: (1) NIE Center on Teacher Quality and Effectiveness; (2) NIE Center on Student Testing, Evaluation, and Standards; (3) NIE Center on Effective Elementary Schools; and (4) NIE Center on Effective Secondary Schools. The NIE Center on Teacher Quality and Effectiveness is supposed to gather data from the teachers' perspective on working conditions and factors that affect teachers' decisions to stay in the profession. NCES might collaborate with the NIE Center on Student Testing, Evaluation, and Standards in the development and refinement of tests that measure higher-level cognitive skills in reading, mathematics, and science. Finally, NCES might work with the NIE Centers on Effective Elementary Schools and Effective Secondary Schools to collect time data and observational data on what students are actually doing and learning in elementary and secondary classrooms including data on usage of microcomputers.

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